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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/772,473	02/05/2004	George Bokisa	TASKP103US	4978
23623	7590	04/02/2008		
AMIN, TUROCY & CALVIN, LLP			EXAMINER	
1900 EAST 9TH STREET, NATIONAL CITY CENTER			WONG, EDNA	
24TH FLOOR,			ART UNIT	PAPER NUMBER
CLEVELAND, OH 44114			1795	
NOTIFICATION DATE		DELIVERY MODE		
04/02/2008		ELECTRONIC		

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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Application Number: 10/772,473

Filing Date: February 05, 2004

Appellant(s): BOKISA ET AL.

Gregory Turocy
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed March 3, 2008 appealing from the Office action mailed December 13, 2006.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is deficient. 37 CFR 41.37(c)(1)(v) requires the summary of claimed subject matter to include: (1) a concise explanation of the subject matter defined in each of the independent claims involved in the appeal, referring to the specification by page and line number, and to the drawing, if any, by reference characters and (2) for each independent claim involved in

the appeal and for each dependent claim argued separately, every means plus function and step plus function as permitted by 35 U.S.C. 112, sixth paragraph, must be identified and the structure, material, or acts described in the specification as corresponding to each claimed function must be set forth with reference to the specification by page and line number, and to the drawing, if any, by reference characters. The brief is deficient because the subject matter defined in Claim **26** is not mapped with reference to the specification by page and line number and to the drawings, if any, by reference characters.

However, reference to Claim **26** is made to the specification at page 2, lines 14-19; page 12, lines 13-20; and page 16, lines 5-26.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

10-245693	KUNISHI ET AL.	9-1998
3,697,391	PASSAL	10-1972
1,544,847	RAMANAUSKIENE ET AL.	2-1990

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

I. Claims 1-8 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 10-245693 (JP '693) [* based on the JPO machine translation *] in combination with Passal (US Patent No. 3,697,391).

JP '693 teaches a method of electroplating an alloy comprising nickel, cobalt and boron comprising:

(a) providing an electroplating bath comprising:

- (i) an anode (= from carrying out electroplating) [page 5, claim 2];
- (ii) a cathode (= from carrying out electroplating) [page 5, claim 2];

- (iii) water (= from water-soluble) [page 1, [0007]];
 - (iv) ionic nickel (= from a water-soluble salt of Ni) [page 1, [0007]]; and abstract];
 - (v) ionic cobalt (= from a water-soluble salt of Co);
 - (vi) an amine-borane compound selected from the group consisting of dimethylamine borane, t-butylamine borane, and hydrates thereof (= dimethylamineborane, 74-94-2) [abstract]; and
 - (vii) at least one brightener (= a quaternary ammonium salt brightener) [page 1, [0007]; and abstract]; and
- (b) applying a current (page 4, Table 2) to the electroplating bath whereby the alloy comprising nickel, cobalt and boron forms on the cathode (= nickel alloy) [page 1, [0007]; and abstract].

The electroplating bath has a pH from about 2 to about 6 (= pH 3-10) [page 1, [0007]; and page 3, Table 1] and a temperature from about 10°C to about 90°C (page 3, Table 1]; and a current density of about 1 ASF or more and about 500 ASF or less is applied to the electroplating bath (page 4, Table 2).

The electroplating bath is provided by combining water (= from water-soluble) [page 1, [0007]], nickel sulfate (10043-35-3), cobalt sulfate (13770-89-3), and dimethylamine borane (74-94-2) [abstract] and at least one brightener (= a quaternary ammonium salt brightener) [page 1, [0007]].

The nickel cobalt boron alloy comprises about 2% by weight or less of

components other than nickel, cobalt and boron (= and optional water-soluble salt of B, Co, Cu, Fe, Mn, P, Sn and/or Zn) [abstract].

The electroplating bath comprises from about 0.001% to about 5% by weight of the brightener (= 0.01-0.5 g/l = 0.001-0.05%) [page 2, [0015]].

The method of JP '693 differs from the instant invention because JP '693 does not disclose the following:

- a. Wherein the electroplating bath comprises at least one acetylenic brightener, as recited in claim 1.
- b. Wherein the acetylenic brightener is selected from the group consisting of acetylenic alcohols, acetylenic amines, acetylenic esters, acetylenic sulfonic acids and sulfonates, alkoxylated acetylenic alcohols, and acetylenic carboxylic acids, as recited in claim 3.
- c. Wherein the acetylenic brightener is selected from the group consisting of ethoxylated butynediol; 2-butyne-1,4-diol; propargyl alcohol; ethoxylated propargyl alcohol; hydroxyethyl propynyl ether; beta-hydroxypropyl, propynyl ether; gamma-propynyoxy, bis-beta-hydroxyethyl ether 2-butyn-1,4-diol; bis-beta-hydroxypropyl ether 2-butyn-1,4-diol; 1,4-di-(beta-hydroxyethoxy)-2-butyne; 1,4-di-(beta-hydroxy-gamma-chloropropoxy)-2-butyne; 1,4-di-(beta-gamma-epoxypropoxy)-2-butyne; 1,4-di-(beta-hydroxy-gamma-butoxy)-2-butyne; 1,4-di-(2'-hydroxy-4'-oxa-6'-heptenoxy)-2-butyne; 2,4,6-trimethyl N-propargyl pyridinium bromide; 2-methyl-3-butyn-2-ol; 1-(beta-

hydroxyethoxy)-2-propyne; and 1-(beta-hydroxypropoxy)-2-propyne, as recited in claim 23.

Like JP '693, Passal teaches pyridinium salt brighteners (col. 3, lines 8-9) in a nickel-cobalt alloy electroplating bath (col. 11, Example 8). Passal adds effective amounts of at least one member selected from the group of cooperating additives consisting of:

- (a) a primary brightener;
- (b) a secondary brightener;
- (c) a second auxiliary brightener, and
- (d) an anti-pitting agent (col. 2, lines 41-47)

to typical nickel-containing, cobalt-containing and nickel-cobalt-containing bath compositions (col. 6, lines 30-38; and cols. 11-12, Example 8).

Examples of a primary brightener are 2,4,6-trimethyl N-propargyl pyridinium bromide, 2-butyne-1,4-diol, propargyl alcohol and 2-methyl-3-butyn-2-ol (col. 3, lines 3-31).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the brightener described by JP '693 with wherein the brightener is at least one acetylenic brightener because substituting the pyridinium salt brightener with an acetylenic brightener would have been functionally equivalent as taught by Passal (col. 3, lines 3-23).

It would have been obvious to one having ordinary skill in the art at the time the

invention was made to have modified the electroplating bath described by JP '693 with wherein the electroplating bath comprises at least one acetylenic brightener because on adding such brighteners to the electroplating bath, a brilliant, well-leveled, quite ductile deposit was obtained which had low current density coverage as taught by Passal (cols. 11-12, Example 8).

d. Wherein the electroplating bath further comprises at least one sulfur containing brightener selected from the group consisting of sulfinic acids, sulfonic acids, aromatic sulfonates, aromatic sulfinites, sulfonamides, sulfonimides, sulfimides, and sulfo-betaines, as recited in claim 2.

Passal teaches that examples of a secondary brightener are aromatic sulfonates, sulfoamides, sulfonimides and sulfinites (col. 3, lines 32-41).

Passal teaches that such plating additives compounds, which may be used singly or in suitable combinations, have one of more of the following functions:

(1) To obtain semi-lustrous deposits or to produce substantial grain-refinement over the usual dull, matter, grainy, non-reflective deposits from additive free baths.

(2) To act as ductilizing agents when used in combination with other additives such as primary brighteners.

(3) To control internal stress of deposits, generally by making the stress desirably compressive.

(4) To introduce controlled sulfur contents into the electrodeposits to desirably affect chemical reactivity, potential differences in composite coating systems, etc. thereby decreasing corrosion, better protecting the basis metal from corrosion, etc. (col. 3, lines 42-56; and col. 4, lines 2-22).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the electroplating bath described by JP '693 with wherein the electroplating bath further comprises at least one sulfur containing brightener selected from the group consisting of sulfinic acids, sulfonic acids, aromatic sulfonates, aromatic sulfinites, sulfonamides, sulfonimides, sulfimides, and sulfo-betaines because such plating additive compounds used in suitable combinations would have had one of more of the above functions (1) to (4) as taught by Passal (col. 3, lines 42-56).

e. Wherein the electroplating bath comprises about 40 g/l or more and about 100 g/l or less of ionic nickel; about 1 g/l or more and about 30 g/l or less of ionic cobalt; and about 0.2 g/l or more and about 10 g/l or less of the amine-borane compound, as recited in claim 4.

The bath disclosed by JP '693 inherently has an ionic nickel concentration, an ionic cobalt concentration, and an amine-borane compound concentration.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the ionic nickel, ionic cobalt and amine-borane

compound concentrations described by JP '693 with wherein the electroplating bath comprises about 40 g/l or more and about 100 g/l or less of ionic nickel; about 1 g/l or more and about 30 g/l or less of ionic cobalt; about 0.2 g/l or more and about 10 g/l or less of the amine-borane compound because it has been held that changes in temperature, concentration or both, is not a patentable modification; however, such changes may impart patentability to a process if the ranges claimed produce new and unexpected results which are different in kind and not merely in degree from results of the prior art, such ranges are termed "critical" ranges and Appellant has the burden of proving such criticality; even though Appellant's modification results in great improvement and utility over the prior art, it may still not be patentable if the modification was within capabilities of one skilled in the art; more particularly, where general conditions of the claim are disclosed in the prior art, it is not inventive to discover optimum or workable ranges by routine experimentation. *In re Aller*, 220 F2d 454, 456, 105 USPQ 233, 235 (CCPA 1955) and MPEP § 2144.05.

f. Wherein the anode comprises at least one of nickel, cobalt, boron, iridium oxide, platinum, titanium, graphite, carbon and platinum-titanium, as recited in claim 7.

The electroplating disclosed by JP '693 inherently uses an anode.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the anode described by JP '693 with wherein the anode comprises at least one of nickel, cobalt, boron, iridium oxide, platinum, titanium,

graphite, carbon and platinum-titanium because Passal teaches using an anode comprised of nickel for electroplating a nickel-cobalt alloy (cols. 11-12, Example 8).

Furthermore, it is common in the electroplating art to have used electrodes made of the same material that was being deposited for purity.

II. Claims **9-12, 15 and 24** are rejected under 35 U.S.C. 103(a) as being unpatentable over **JP 10-245693** (JP '693) in combination with **Passal** (US Patent No. 3,697,391).

JP '693 and Passal are as applied for reasons as discussed above and incorporated herein.

JP '693 also teaches wherein the electroplating bath further comprises at least one organic brightener selected from the group consisting of ethylenic alcohols, coumarins, aldehydes, compounds containing a C=N linkage and heterocyclics (= a heterocyclic quaternary ammonium compound as a brightener) [page 1, [007]; and abstract].

III. Claim **13** is rejected under 35 U.S.C. 103(a) as being unpatentable over **JP 10-245693** (JP '693) in combination with **Passal** (US Patent No. 3,697,391) as applied to claims 9-12, 15 and 24 above, and further in view of **SU 1,544,847** (SU '847).

JP '693 and Passal are as applied above and incorporated herein.

The method of JP '693 differs from the instant invention because JP '693 does

not disclose wherein the sulfur-containing brightener is a sulfo-betaine brightener, as recited in claim 13.

SU '847 teaches that the addition of a betaine of 2-(4-pyridyl) ethanesulfonic acid increases the hardness of a nickel or nickel-cobalt alloy coating (abstract).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the sulfur-containing brightener described by Passal with wherein the sulfur-containing brightener is a sulfo-betaine brightener because the addition of a betaine of 2-(4-pyridyl) ethanesulfonic acid would have increased the hardness of a nickel or nickel-cobalt alloy coating as taught by SU '847 (abstract).

The reason or motivation to modify the reference may often suggest what the inventor has done, but for a different purpose or to solve a different problem. It is not necessary that the prior art suggest the combination to achieve the same advantage or result discovered by the Appellants. *In re Linter* 458 F.2d 1013, 173 USPQ 560 (CCPA 1972); *In re Dillon* 919 F.2d 688, 16 USPQ2d 1897 (Fed. Cir. 1990), *cert. denied*, 500 US 904 (1991); and MPEP § 2144.

IV. Claims 26-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 10-245693 (JP '693) in combination with **Passal** (US Patent No. 3,697,391).

JP '693 and Passal are as applied for reasons as discussed above and incorporated herein.

(10) Response to Argument

A. Rejection of Claims 1-8 and 23 Under 35 U.S.C. § 103(a)

* JP 10-245693 JP ('693) is based on the McElroy English translation. *

- a. The cited art does not teach or suggest each and every limitation.

Appellants state that JP '693 is largely directed toward plating elemental nickel or nickel alloyed with one of boron, cobalt, copper, iron, manganese, phosphorus, tin, or zinc. JP '693, para. [0007]. The examples do not encompass a process to electroplate a ternary alloy comprising nickel, cobalt and boron nor the formation thereof with mirror bright properties. This is because, in part, one cannot electroplate significant amounts of boron from boric acid into the crystal structure of an alloy.

In response, JP '693 teaches that the nickel or nickel alloy electroplating baths possess the following constitution:

(1) Nickel salts or nickel salts and ***at least one selected from water-soluble salts of boron, cobalt, copper, iron, manganese, phosphorus, tin, and zinc;*** and

(2) Quaternary ammonium compounds as brighteners which can be represented by any of the general formulas [A]-[S] (page 1, claim 1; and page 8, [0007]).

This teaching would have suggested to one having ordinary skill in the art to combine the nickel salts with one water-soluble salt (binary), ***two water-soluble salts (ternary),*** three water-soluble salts (quaternary), and etc.

This teaching would have suggested ***a ternary Ni-Co-B alloy.***

The disclosed examples and preferred embodiments do not constitute a teaching

away from a broader disclosure or nonpreferred embodiments (MPEP § 2123 (II)).

The Appellants have a different reason for, or advantage resulting from doing what the prior art relied upon has suggested, it is noted that it is well settled that this is not demonstrative of nonobviousness. *In re Kronig* 190 USPQ 425, 428 (CCPA 1976); *In re Linter* 173 USPQ 560 (CCPA 1972); the prior art motivation or advantage may be different than that of Appellants while still supporting a conclusion of obviousness. *In re Wiseman* 201 USPQ 658 (CCPA 1979); *Ex parte Obiaya* 227 USPQ 58 (Bd. of App. 1985) and MPEP § 2144.

Appellants' specification discloses that the boric acid does not provide a significant portion of platable boron, although in some instances it may provide minor amounts of platable boron (page 5, lines 5-7). Appellants' claims do not recite the amount of boron electroplated.

Appellants state that Passal is directed toward electroplating nickel, cobalt, or nickel-cobalt binary alloys. Passal, col. 2, ln. 23-24. There is no mention in Passal of any possibility of ternary alloys, whatsoever, nor any alloys containing boron.

In response, the rejection is not overcome by pointing out that one reference does not contain a particular limitation when reliance for that teaching is on another reference. *In re Lyons* 150 USPQ 741 (CCPA 1966). Moreover, it is well settled that one cannot show nonobviousness by attacking the references individually where, as here, the rejection is based on a combination of references. *In re Keller* 208 USPQ 871

(CCPA 1981); *In re Young* 159 USPQ 725 (CCPA 1968).

JP '693 teaches that the nickel or nickel alloy electroplating baths possess nickel salts or **nickel salts** and **at least one selected from water-soluble salts of boron, cobalt**, copper, iron, manganese, phosphorus, tin, and zinc (page 1, claim 1; and page 8, [0007]). This teaching would have suggested a **ternary Ni-Co-B alloy**.

Passal was used in the Examiner's rejection for the teaching of using "primary brighteners" such as N-heterocyclics, acetylenics, active sulfur compounds, dyestuffs, etc. (col. 3, lines 3-23) in a nickel-cobalt alloy electroplating bath comprising nickel salts, a water-soluble cobalt and a water-soluble boron such as:

<i>NiSO₄ · 7H₂O</i>	-----	300 g/l
<i>NiCl₂ · 6H₂O</i>	-----	60 g/l
<i>CoSO₄ · 7H₂O</i>	-----	60 g/l
<i>H₃BO₃</i>	-----	40 g/l
Sodium benzene monosulfonate	-----	7.5 g/l
Sodium allyl sulfonate	-----	2.3 g/l
<i>2-methyl-3-butyn-2-ol</i>	-----	0.01 g/l
N-1,2-dichloropropenyl pyridinium chloride -	-----	0.01 g/l
Sodium di-n-hexyl sulfosuccinate	-----	0.025 g/l
pH (electrometric)	-----	3.8

(cols. 11-12, Example 8).

The invention as a whole would have been obvious to one having ordinary skill in

the art at the time the invention was made to have modified the electroplating baths described by JP '693 with at least one acetylenic brightener because acetylenic compounds such as 2-butyne-1,4-diol, bis- β -hydroxyethyl ether of 2-butyne-1,4-diol, propargyl alcohol, 2-methyl-3-butyn-2-ol are plating additive compounds known as primary brighteners used in nickel-cobalt alloy electroplating baths comprising nickel salts, a water-soluble boron and a water-soluble cobalt, wherein best results are obtained when the primary brighteners are used with either a secondary brightener, a secondary auxiliary brightener, or both to provide optimum luster, rate of brightening, leveling, bright plate current density range, low current coverage, etc. as taught by Passal (col. 3, lines 3-31; and cols. 11-12, Example 8).

Appellants state that because one cannot electroplate boron from boric acid into the crystal structure of an alloy, *Passal fails to describe ternary alloys equivalent to those formed by the method of the claims.*

Appellants' state that JP '693 and Passal contain no teachings regarding forming a *ternary alloy of nickel, cobalt and boron nor providing a plating bath containing a nickel salt, a cobalt salt, and dimethylamine borane and/or t-butylamine borane* as recited by claim 1.

In response, the rejection is not overcome by pointing out that one reference does not contain a particular limitation when reliance for that teaching is on another reference. *In re Lyons* 150 USPQ 741 (CCPA 1966). Moreover, it is well settled that one

cannot show nonobviousness by attacking the references individually where, as here, the rejection is based on a combination of references. *In re Keller* 208 USPQ 871 (CCPA 1981); *In re Young* 159 USPQ 725 (CCPA 1968).

JP '693 teaches a ternary Ni-Co-B alloy as discussed above.

JP '693 teaches "at least one selected from **water-soluble salts of boron ...**" (page 1, claim 1; and page 8, [0007]).

JP '693 teaches **dimethylamine borane** (pages 10-11, Table 1, Key no. 14).

This compound would have been the **water-soluble salt of boron** when selected.

The dimethylamine borane is the same compound as presently claimed in Appellants' claim 1, and thus, boron would have been electroplated as presently claimed because a compound and all of its properties are inseparable. *In re Papesch*, 315 F.2d 381, 391, 137 USPQ 43, 51 (CCPA 1963) [MPEP § 2141.02(V)].

b. **The difference in the chemical mechanism between the prior art and the claimed invention does not allow for one having ordinary skill in the art to predict the performance of brighteners employed in the claimed invention.**

Appellants state that JP' '693 and Passal **provide no instruction regarding the selection of brighteners** to obtain any improvement in electroplating such ternary alloys.

Appellants state that due in part to the lack of any teachings in JP '693 and Passal concerning Ni-Co-B ternary alloys, JP '693 and Passal **provide no instruction regarding the selection of brighteners** to obtain any improvement in electroplating such

ternary alloy.

In response, Passal teaches:

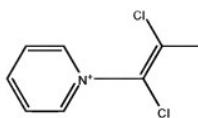
NiSO ₄ · 7H ₂ O -----	300 g/l
NiCl ₂ · 6H ₂ O -----	60 g/l
CoSO ₄ · 7H ₂ O -----	60 g/l
H ₃ BO ₃ -----	40 g/l
Sodium benzene monosulfonate -----	7.5 g/l
Sodium allyl sulfonate -----	2.3 g/l
2-methyl-3-butyn-2-ol -----	0.01 g/l
N-1,2-dichloropropenyl pyridinium chloride 0.01 g/l	
Sodium di-n-hexyl sulfosuccinate -----	0.025 g/l
pH (electrometric) -----	3.8

(cols. 11-12, Example 8).

Passal teaches ***the selection and combination*** of an acetylenic brightener (2-methyl-3-butyn-2-ol) and a N-heterocyclic brightener (N-1,2-dichloropropenyl pyridinium chloride).

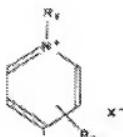
JP '693 teaches quaternary ammonium compounds which are N-heterocyclic brighteners (pyridinium compounds) [pages 1-6, claim 1]

N-1,2-dichloropropenyl ***pyridinium chloride*** has the following chemical formula:



N-1,2-dichloropropenyl pyridinium chloride (cols. 11-12, Example 8).

A quaternary ammonium compound disclosed by JP '693 has the following chemical formula:



(= R is a C₆₋₁₈ alkyl group and X is

a halogen ion = **a pyridinium chloride**) [page 2].

One having ordinary skill in the art would have reasonably expected that the chemical mechanism of an acetylenic brightener and a pyridinium chloride would have been no different than what is presently claimed because similar processes can reasonably be expected to yield products which inherently have the same properties. *In re Spada* 15 USPQ 2d 1655 (CAFC 1990); *In re DeBlauwe* 222 USPQ 191; *In re Wiegand* 86 USPQ 155 (CCPA 195).

Furthermore, the reason or motivation to modify the reference may often suggest what the inventor has done, but for a different purpose or to solve a different problem. It is not necessary that the prior art suggest the combination to achieve the same advantage or result discovered by the Appellants. *In re Linter* 458 F.2d 1013, 173

USPQ 560 (CCPA 1972); *In re Dillon* 919 F.2d 688, 16 USPQ2d 1897 (Fed. Cir. 1990), cert. denied, 500 US 904 (1991); and MPEP § 2144.

Appellants state that the claimed invention was motivated by a desire to identify conditions and brighteners suitable for plating a nickel-cobalt-boron alloy with a mirror bright finish over an extended range of current density, as demonstrated in Figure 4 of the Application. Presumably when the Examiner refers to "looking to develop a nickel-cobalt-boron alloy bath," the motivation is similarly for a mirror bright finish over an extended range of current density, since a Ni-Co-B alloy can be obtained without the use of any brighteners (although the resulting alloy will be of an unacceptable quality). See Application, comparative example 1 (discussing a bath for forming a Ni-Co-B alloy without any brighteners).

In response, the reason or motivation to modify the reference may often suggest what the inventor has done, but for a different purpose or to solve a different problem. It is not necessary that the prior art suggest the combination to achieve the same advantage or result discovered by the Appellants. *In re Linter* 458 F.2d 1013, 173 USPQ 560 (CCPA 1972); *In re Dillon* 919 F.2d 688, 16 USPQ2d 1897 (Fed. Cir. 1990), cert. denied, 500 US 904 (1991); and MPEP § 2144.

Appellants state that JP '693 and Passal, do not have any teachings regarding formation of a ternary nickel-cobalt-boron alloy nor using dimethylamine borane or t-

butylamine borane as a boron source to from a nickel-cobalt-boron alloy.

In response, JP '693 teaches a ternary Ni-Co-B alloy using dimethylamine borane as discussed above.

Appellants state that JP '693 and Passal fail to describe any boron source for making a ternary alloy wherein boron is uniformly incorporated in the alloy crystal structure.

In response, "making a ternary alloy wherein boron is uniformly incorporated in the alloy crystal structure" is not recited in the Appellants' claims. It is well settled that unpatented claims are given the broadest, most reasonable interpretation and that limitations are not read into the claims without a proper claim basis therefor. *In re Prater* 415 F. 2d 1393, 162 USPQ 541 (CCPA 1969); *In re Zeltz* 893 F. 2d 319, 13 USPQ 1320.

JP '693 teaches a ternary Ni-Co-B alloy as discussed above.

JP '693 teaches "at least one selected from **water-soluble salts of boron ...**" (page 1, claim 1; and page 8, [0007]).

JP '693 teaches **dimethylamine borane** (pages 10-11, Table 1, Key no. 14). This compound would have been the **water-soluble salt of boron** when selected.

The dimethylamine borane is the same compound as presently claimed in Appellants' claim 1, and thus, boron would have been uniformly incorporated in the alloy crystal structure because a compound and all of its properties are inseparable. *In re*

Papesch, 315 F.2d 381, 391, 137 USPQ 43, 51 (CCPA 1963) [MPEP § 2141.02(V)].

And similar processes can reasonably be expected to yield products which inherently have the same properties. *In re Spada* 15 USPQ 2d 1655 (CAFC 1990); *In re DeBlauwe* 222 USPQ 191; *In re Wiegand* 86 USPQ 155 (CCPA 195).

Appellants state that JP '693 does not appear to have any concern or teachings regarding the brightness of the deposited metal alloys discussed therein. JP '693 is directed towards deposition on electronic components for the prevention of solder encroachment. JP'693, para. [0002].

Appellants state that JP '693 does not contain any statements regarding the brightness of the metal deposits formed. Neither reference provides any guidance concerning increasing specular reflection of Ni-Co-B ternary alloys.

In response, the Appellants have a different reason for, or advantage resulting from doing what the prior art relied upon has suggested, it is noted that it is well settled that this is not demonstrative of nonobviousness. *In re Kronig* 190 USPQ 425, 428 (CCPA 1976); *In re Linter* 173 USPQ 560 (CCPA 1972); the prior art motivation or advantage may be different than that of Appellants while still supporting a conclusion of obviousness. *In re Wiseman* 201 USPQ 658 (CCPA 1979); *Ex parte Obiaya* 227 USPQ 58 (Bd. of App. 1985) and MPEP § 2144.

Furthermore, Passal discloses compounds "to give much better rates of brightening" (col. 4, lines 8-18).

c. The function of the brighteners disclosed in JP '693 are fundamentally different from those disclosed by Passal, and substitution of brighteners in the method of JP '693 with those of Passal serves to make the method of JP '693 inoperable.

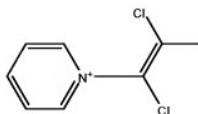
Appellants state that the generic usage of the term "brightener" is apparent in both Passal and JP '693. Again, Passal states that "a primary brightener may produce no visual effect" at all. Passal, col. 3. In. 24-25. A person having ordinary skill in the art will interpret this statement as meaning that some of the brighteners have no effect on specular reflection regardless of the concentration and other conditions used.

"Brighteners" that do not increase specular reflection may have other useful effects such as acting as a surfactant and/or lowering surface tension, solubilizing materials, and tightening grain structure.

In response, Passal teaches **the selection and combination** of an acetylenic brightener (2-methyl-3-butyn-2-ol) and a N-heterocyclic brightener (N-1,2-dichloropropenyl pyridinium chloride) as discussed above.

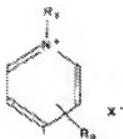
JP '693 teaches quaternary ammonium compounds which are N-heterocyclic brighteners (pyridinium compounds) [pages 1-6, claim 1]

N-1,2-dichloropropenyl **pyridinium chloride** has the following chemical formula:



Cf
N-1,2-dichloropropenyl pyridinium chloride (cols. 11-12, Example 8).

A quaternary ammonium compound disclosed by JP '693 has the following chemical formula:



(= R is a C₆₋₁₈ alkyl group and X is a halogen ion = **a pyridinium chloride**) [page 2].

One having ordinary skill in the art would have reasonably expected that the chemical mechanism of an acetylenic brightener and a pyridinium chloride would have been no different than what is presently claimed because similar processes can reasonably be expected to yield products which inherently have the same properties. *In re Spada* 15 USPQ 2d 1655 (CAFC 1990); *In re DeBlauwe* 222 USPQ 191; *In re Wiegand* 86 USPQ 155 (CCPA 1995).

Furthermore, the reason or motivation to modify the reference may often suggest what the inventor has done, but for a different purpose or to solve a different problem. It is not necessary that the prior art suggest the combination to achieve the same advantage or result discovered by the Appellants. *In re Linter* 458 F.2d 1013, 173 USPQ 560 (CCPA 1972); *In re Dillon* 919 F.2d 688, 16 USPQ2d 1897 (Fed. Cir. 1990), cert. denied, 500 US 904 (1991); and MPEP § 2144.

Appellants state that the quaternary amine "brighteners" of JP '693 are fully

described as being plating inhibitors and no discussion whatsoever is made regarding the ability of the quaternary amines disclosed therein to form plated metal surfaces with any particular specular reflectance properties.

Appellants state that any substitution and/or addition of "brighteners" to the method of JP '693 is only "functionally equivalent," as argued by the Examiner, if such substitution and/or addition is of compounds that act as plating inhibitors. The inclusion of additives that do not have amphiphilic character goes directly against and contravenes the clear teaching of JP '693 in paragraph [0012]. Further, just as JP '693 contains no teaching regarding additives having a tendency to increase specular reflection, Passal has no teachings concerning additives having plating inhibition functionality as to prefer plating onto conducting surfaces relative to non-conductive surfaces. Passal has no teachings regarding plating onto non-conductive surfaces whatsoever.

In response, when Appellants claim a material in terms of a function, property or characteristic and ***the material of the prior art is similar as that of the claim*** but the function is not explicitly disclosed by the references, the discovery of properties of a known material does not make it novel, the identification and characterization of a prior art material also does not make it novel.

Appellants' claims **1** and **26** are open to the electroplating bath further comprising N-heterocyclic brighteners.

A combination of N-heterocyclic and acetylenic brighteners is already claimed in

Appellants claims 9 and 15, wherein claim 15, lines 1-4, recites "wherein the electroplating bath further comprises at least one organic brightener selected from the group consisting of ethylenic alcohols, coumarins, aldehydes, compounds containing a C≡N linkage, and **heterocyclics.**"

Passal teaches that the term "primary brightener" as used herein is meant to include plating additive compounds such as **N-heterocyclics, acetylenics**, active sulfur compounds, dyestuffs, etc. When used alone or in combination, a primary brightener may produce no visual effect on the electrodeposit, or may produce semi-lustrous, fine-grained deposits. However, best results are obtained when primary brighteners are used with either a secondary brightener, a secondary auxiliary brightener, or both to provide optimum luster, rate of brightening, leveling, bright plate current density range, low current coverage, etc. (col. 3, lines 3-31; and col. 4, lines 2-44).

These teachings would have suggested to one having ordinary skill in the art:

- (i) that N-heterocyclics and acetylenics would have been functionally equivalent as primary brighteners (Passal, col. 3, lines 3-6) in a nickel-cobalt alloy electroplating bath comprising nickel salts, a water-soluble cobalt and a water-soluble boron;
- (ii) that using a combination of brighteners would have obtained the optimum luster and rate of brightening. A combination of the primary brighteners such as N-heterocyclics and acetylenics with secondary brighteners would have done this (Passal, col. 3, lines 42-56; and col. 4, lines 8-18); and

(iii) that the quaternary ammonium compounds as brighteners disclosed by JP '693 are N-heterocyclic compounds (= general formulas [A]-[S]) [pages 1-6, claim 1], and thus, the N-heterocyclic compounds disclosed by JP '693 would have been suitable in combination with the acetylenics disclosed by Passal (col. 3, lines 3-31).

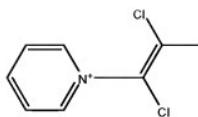
d. Passal does not teach that a combination of pyridinium brighteners disclosed in JP '693 and the acetylenic brighteners disclosed in Passal yields improved deposits.

Appellants state that to the extent that "the best results" are increased surface brightness, there is no teaching in JP '693 or elsewhere in the art that the pyridinium compounds disclosed in JP '693 have any functionality in improving surface brightness. As such, there cannot be motivation to seek a combination of pyridinium and acetylenic brighteners to increase surface brightness.

In response, Passal teaches ***the selection and combination*** of an acetylenic brightener (2-methyl-3-butyn-2-ol) and a N-heterocyclic brightener (N-1,2-dichloropropenyl pyridinium chloride) as discussed above.

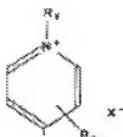
JP '693 teaches quaternary ammonium compounds which are N-heterocyclic brighteners (pyridinium compounds) [pages 1-6, claim 1]

N-1,2-dichloropropenyl ***pyridinium chloride*** has the following chemical formula:



N-1,2-dichloropropenyl pyridinium chloride (cols. 11-12, Example 8).

A quaternary ammonium compound disclosed by JP '693 has the following chemical formula:



(= R is a C₆₋₁₈ alkyl group and X is

a halogen ion = **a pyridinium chloride**) [page 2].

One having ordinary skill in the art would have reasonably expected that the chemical mechanism of an acetylenic brightener and a pyridinium chloride would have been no different than what is presently claimed because similar processes can reasonably be expected to yield products which inherently have the same properties. *In re Spada* 15 USPQ 2d 1655 (CAFC 1990); *In re DeBlauwe* 222 USPQ 191; *In re Wiegand* 86 USPQ 155 (CCPA 195).

Furthermore, the reason or motivation to modify the reference may often suggest what the inventor has done, but for a different purpose or to solve a different problem. It is not necessary that the prior art suggest the combination to achieve the same advantage or result discovered by the Appellants. *In re Linter* 458 F.2d 1013, 173

USPQ 560 (CCPA 1972); *In re Dillon* 919 F.2d 688, 16 USPQ2d 1897 (Fed. Cir. 1990), cert. denied, 500 US 904 (1991); and MPEP § 2144.

Appellants state that Passal does not teach that any, random combination of brighteners or greater quantity of brighteners leads to better results. Instead, Passal teaches that the quality of electrodeposits is sensitive to all bath components. Further, Passal's whole teaching is only that the inclusion of a hydroxyl-sulfonate generally improves the performance of the disclosed classes of brighteners, and Passal does not generally teach how any of the disclosed brighteners perform in systems other than the conditions disclosed in the examples. Passal, col. 2, ln. 40-59 and col. 11, ln. 37 through col. 12, ln. 15. Therefore, Passal does not provide motivation to use a combination of pyridinium and acetylenic brighteners as argued by the Examiner.

In response, Passal teaches ***the selection and combination*** of an acetylenic brightener (2-methyl-3-butyn-2-ol) and a N-heterocyclic brightener (N-1,2-dichloropropenyl pyridinium chloride) as discussed above.

There is no requirement that the motivation to make the combination be expressly articulated in one or more of the references. The teaching, suggestion or inference can be found not only in the references but also from knowledge generally available to one of ordinary skill in the art. *Ashland Oil v. Delta Resins* 227 USPQ 657 (CAFC 1985). The test for combining references is what the combination of disclosures taken as a whole would suggest to one of ordinary skill in the art. *In re McLaughlin* 170

USPQ 209 (CCPA 19710; *In re Rosselet* 146 USPQ 183 (CCPA 1960). References are evaluated by what they collectively suggest to one versed in the art, rather than by their specific disclosures. *In re Simon* 174 USPQ 114 (CCPA 1972); *In re Richman* 165 USPQ 509, 514 (CCPA 1970).

Furthermore, Appellants recite "the electroplating bath comprising" (from claim 1, line 3). The transitional term "comprising", which is synonymous with "including", "containing", or "characterized by", is inclusive or open-ended and does not excludes additional, unrecited elements or methods steps (MPEP § 2111.03).

Appellants' claims as presently written are open to include more than one brightener.

e. The performance of brighteners in the claimed invention is unpredictable; therefore, there is a lack of a finite number of predictable solutions to support a finding of obviousness.

Appellants state that they claim a method for plating an alloy that is not found in either of neither JP '693 nor Passal, specifically a ternary alloy containing nickel, cobalt, and boron wherein the simultaneous deposition of boron occurs through an electroless mechanism of incorporating an amine-borane into a nickel-cobalt matrix.

In response, JP '693 teaches a ternary Ni-Co-B alloy as discussed above. JP '693 teaches "at least one selected from **water-soluble salts of boron ...**" (page 1, claim 1; and page 8, [0007]).

JP '693 teaches **dimethylamine borane** (pages 10-11, Table 1, Key no. 14).

This compound would have been the water-soluble salt of boron when selected.

The dimethylamine borane is the same compound as presently claimed in Appellants' claim 1, and thus, boron would have been simultaneous deposited through an electroless mechanism of incorporating an amine-borane into a nickel-cobalt matrix because a compound and all of its properties are inseparable. *In re Papesch*, 315 F.2d 381, 391, 137 USPQ 43, 51 (CCPA 1963) [MPEP § 2141.02(V)].

"Wherein the simultaneous deposition of boron occurs through an electroless mechanism of incorporating an amine-borane into a nickel-cobalt matrix" is not recited in the Appellants' claims. It is well settled that unpatented claims are given the broadest, most reasonable interpretation and that limitations are not read into the claims without a proper claim basis therefor. *In re Prater* 415 F. 2d 1393, 162 USPQ 541 (CCPA 1969); *In re Zeltz* 893 F. 2d 319, 13 USPQ 1320.

Appellants state that Passal discloses several classes of brighteners without any teaching of which ones are or are not useful singly or in combination for the purpose of improving the brightness of nickel-cobalt alloys (nor nickel-cobalt boron ternary alloys), but only that the inclusion of a hydroxyl-sulfonate generally improves the performance of the disclosed classes of brighteners. Passal, col. 2, ln. 40-59 and col. 11, ln. 37 through col. 12, ln. 15.

Appellants state that there is a lack of a "finite number of identified, predictable

solutions [for which] a person of ordinary skill has good reason to pursue."

In response, Passal teaches ***the selection and combination*** of an acetylenic brightener (2-methyl-3-butyn-2-ol) and a N-heterocyclic brightener (N-1,2-dichloropropenyl pyridinium chloride) as discussed above.

The transitional term "comprising" (from claim 1, lines 2 and 3), which is synonymous with "including", "containing", or "characterized by", is inclusive or open-ended and does not exclude additional, unrecited elements or methods steps (MPEP § 2111.03).

To predict the success of Appellants' method as presently claimed when it reads on an infinite number of electroplating baths, would tell a person of ordinary skill in the art that other combinations of organic additives and/or brightening systems would have been suitable in combination to what is specifically recited in the present claims.

B. Rejection of Claims 9-12, 15 and 24 Under 35 U.S.C. § 103(a)

The rejection of claims 9-12, 15 and 24 under 35 U.S.C. 103(a) as being unpatentable over under 35 U.S.C. 103(a) as being unpatentable over JP 10-245693 (JP '693) in combination with Passal (US Patent No. 3,697,391) has been maintained for the reasons as discussed above.

Appellants' remarks have been fully considered but they are not deemed to be persuasive.

C. Rejection of Claim 13 Under 35 U.S.C. § 103(a)

Appellants state that the application discusses the structure of several sulfo-betaines represented by formulae I through VIII. All the formulae show the sulfur-containing substituent N-linked (the number 1 ring position) to a heterocycle (typically a pyridine ring). The 2-(4-pyridyl)ethanesulfonic acid disclosed by SU '847 has the sulfur-containing substituent attached to the number 4 position of a pyridine ring and is not N-linked.

In response, Appellants' claim 13 recites "wherein the sulfur containing brightener is **a sulfo-betaine brightener.**" The betaine of 2-(4-pyridyl)ethanesulfonic acid disclosed by SU '847 is "a sulfo-betaine brightener" as presently claimed.

D. Rejection of Claims 26-29 Under 35 U.S.C. § 103(a)

Appellants state that one having ordinary skill in the art would not deliberately contravene this clear teaching of JP '693 by employing an acidic pH in the range of 3-5 to plate dimethylamine borane. In view of this, the rejection should be reversed.

In response, Appellants' claim 26, lines 6-7, recites "a pH from about 3 to about 5." A pH of "about 5" reads on a pH of 6.

Furthermore, JP '693 teaches a pH of 3-10 (page 6, claim 3; and page 8, [0009]). The disclosed examples and preferred embodiments do not constitute a teaching away from a broader disclosure or nonpreferred embodiments (MPEP § 2123 (II)).

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

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Supervisory Patent Examiner, Art Unit 1753
Nam Nguyen
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